AVERY SCHOOL 394 (PWSNO 1400003)
SOURCE WATER ASSESSMENT REPORT

March 26, 2003

State of Idaho
Department of Environmental Quality

Executive Summary

Under the Safe Drinking Water Act Amendments of 1996, all states are required by the U.S. Environmental Protection Agency to assess every source of public drinking water for its relative sensitivity to contaminants regulated by the act. This risk assessment is based on a land use inventory in the well recharge zone, sensitivity factors associated with how the well was constructed, and aquifer characteristics.

This report, *Source Water Assessment for the Avery School*, describes the public drinking water well; the well recharge zone and potential contaminant sites located inside the recharge zone boundaries. This assessment, taken into account with local knowledge and concerns, should be used as a planning tool to develop and implement appropriate protection measures for this public water system. **The results should not be used as an absolute measure of risk and they should not be used to undermine public confidence in the water system.**

A single well completed in broken shale on the south side of the St. Joe River supplies drinking water for the Avery School. The water system serves 7 homes and the school in the unincorporated town of Avery in Shoshone County, Idaho. The well was drilled at an unknown date and deepened to 160 feet in 1982. Although the well has historically produced high quality water, a susceptibility analysis conducted by the Idaho Department of Environmental Quality February 13, 2003 ranked the well highly susceptible to contamination. A septic tank approximately 60 feet north of the well, a fuel storage tank about 45 feet to the east and vehicle parking impinge on the sanitary setbacks established under the *Idaho Rules for Public Drinking Water Systems*, putting the well at risk of contamination.

It is important to remember that activity near a well is more likely to cause contamination problems than activities elsewhere in the recharge zone. School maintenance personnel should measure the distances from the well to theses potential sources of contamination. *Idaho Rules for Public Drinking Water Systems* specify a minimum setback between public wells and individual septic tanks of 100 feet. The minimum separation distance between a well and sources of volatile or synthetic organic chemical contaminants is 50 feet. It may be necessary to move the fuel and septic tanks or to apply for a waiver from the required setback distances since the school is located in a narrow canyon. The fuel tank is surrounded by a secondary containment structure which helps mitigate the risk of potential spills. The school has worked on the bus parking area to reduce risks associated with vehicles near a well. The school should also enlist the cooperation of nearby homeowners to ensure that potential contaminants commonly found in garages and shops are stored as far as possible from the wellhead.

This assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what ranking a source receives, protection is always important. Whether the source is currently located in a "pristine" area or an area with numerous industrial and/or agricultural land uses that require education and surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources.

Due to the time involved with the movement of ground water, source water protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. For assistance in developing protection strategies, please contact your regional Department of Environmental Quality office or the Idaho Rural Water Association.

SOURCE WATER ASSESSMENT FOR AVERY SCHOOL

Section 1. Introduction - Basis for Assessment

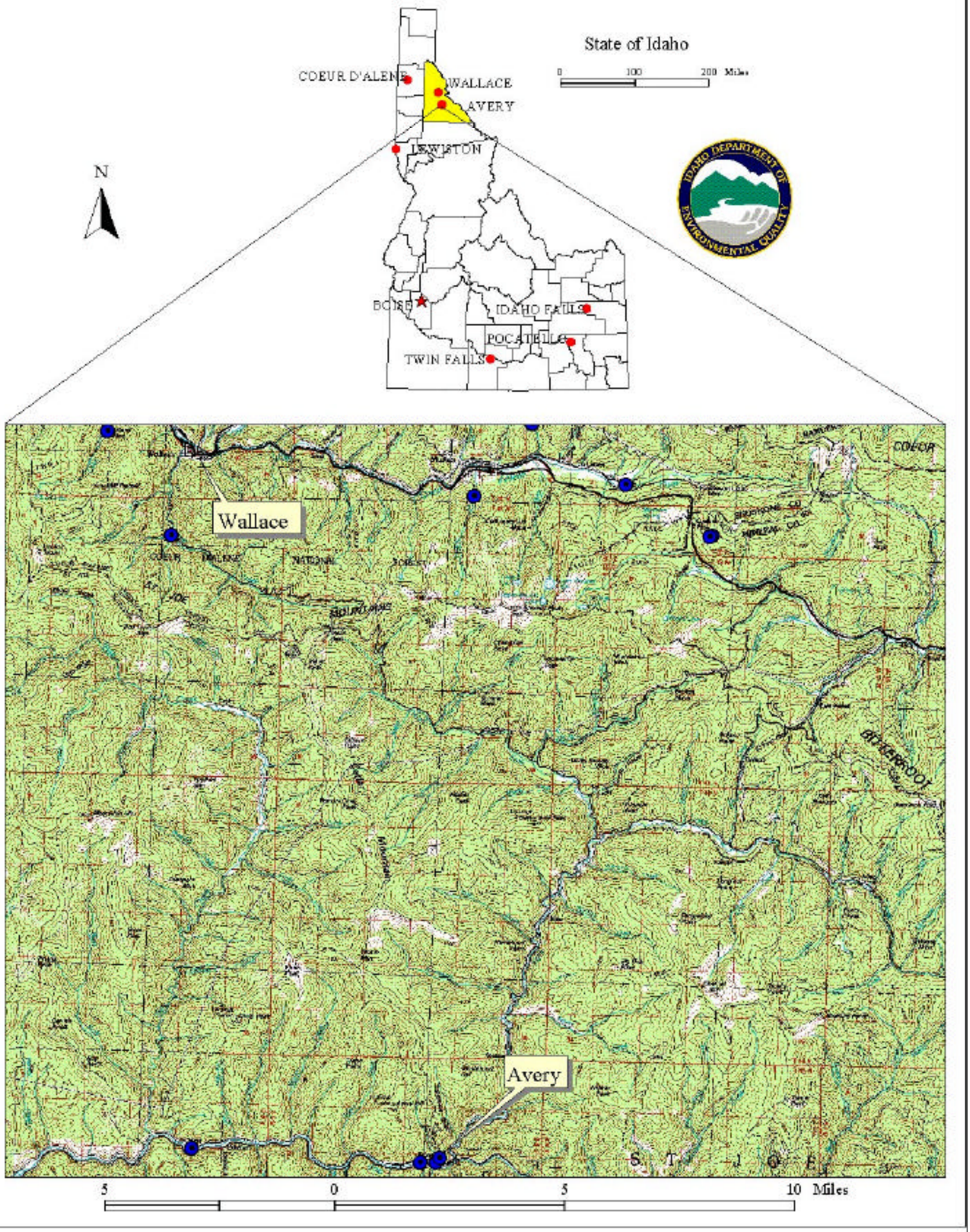
The following sections contain information necessary for understanding how and why this assessment was conducted. **It is important to review this information to understand what the ranking of this source means.** A map showing the delineated source water assessment area and an inventory of significant potential sources of contamination identified within that area are included. The ground water Susceptibility Analysis Worksheet used to develop this assessment is attached.

Level of Accuracy and Purpose of the Assessment

The Idaho Department of Environmental Quality (DEQ) is required by the U.S. Environmental Protection Agency (EPA) to assess every public drinking water source in Idaho for its relative susceptibility to contaminants regulated by the Safe Drinking Water Act. These assessments are based on a land use inventory inside the delineated recharge zones, sensitivity factors associated with how the well is constructed, and aquifer characteristics. The state must complete more than 2900 assessments by May of 2003. Because resources and the time available to accomplish assessments are limited, an in-depth, site-specific investigation for every public water system is not possible.

The results of the source water assessment should not be used as an absolute measure of risk and they should not be used to undermine public confidence in the water system. The ultimate goal of this assessment is to provide data to local communities for developing a protection strategy for their drinking water supply. The Idaho Department of Environmental Quality recognizes that pollution prevention activities generally require less time and money to implement than treating a public water supply system once it has been contaminated. DEQ encourages communities to balance resource protection with economic growth and development. The decision as to the amount and types of information necessary to develop a source water protection program should be determined by the local community based on its own needs and limitations. Wellhead or source water protection is one facet of a comprehensive growth plan, and it can complement ongoing local planning efforts.

Figure 1. Geographic Location of Avery School #394



Section 2. Preparing for the Assessment

Defining the Zones of Contribution - Delineation

The delineation process establishes the physical area around a well that will become the focal point of the assessment. The process includes mapping the boundaries of the well recharge area into time of travel zones indicating the number of years necessary for a particle of water flowing through the aquifer to reach a well. The ground water flow model used data assimilated by DEQ from a variety of sources including local well logs and pumping volume estimates for the Avery School well.

The Avery School water system provides drinking water for 7 homes in addition to the school on the west side of the unincorporated town of Avery on the St. Joe River. (Figure 1). A 160-foot well with an estimated discharge of 100 gallons per minute serves a total population of 50. The well was drilled at an unknown date and deepened in 1982.

The source water assessment delineation for the Avery School well encompasses about 750 acres divided into 0-3, 3-6 and 6-10 year time of travel zones. The length and 600-foot width of the delineation were determined by ground water modeling. Three specific capacity tests for wells in the Avery/Calder vicinity show a drawdown of 0 to 4 feet for multi-hour tests. This result indicates that the cone of depression reached a source of constant recharge. With the wells drilled into the alluvium and close to the St. Joe River, the implication is that the wells are producing river water that has been filtered through the alluvium. The Avery School well is completed in broken shale on the south of the St. Joe River. Consequently, the delineation was focused on the tributaries to the south. Ground water flow simulations were run with a hydraulic conductivity of 200 feet per day. The thickness of aquifer was estimated to be 10 feet, with a porosity value of 0.2, and a recharge value of 1 foot per year. The resulting recharge zone is illustrated in Figure 2.

Identifying Potential Sources of Contamination

The goal of the inventory process is to locate and describe those facilities, land uses, and environmental conditions that are potential sources of ground water contamination. Inventories for all public water systems in Idaho were conducted in two-phases. The first phase involved identifying and documenting potential contaminant sources within a system's source water assessment area through the use of computer databases and Geographic Information System maps developed by DEQ. Maps showing the delineations and tables summarizing the results of the database search were then sent to system operators for review and correction during the second or enhanced phase of the inventory process. Niell Ott reviewed the inventory for Avery School. Information from the public water system file was also incorporated into the potential contaminant inventory.

Figure 2, *Avery School Delineation and Potential Contaminant Inventory* on page 7 of this report shows the location of the Avery School well, the recharge zone delineation boundaries, and potential contaminant sites in the vicinity. Part of the town of Avery lies inside the 0-3 year time of travel zone. Outside of the town, most of the land is undeveloped forest.

Many potential sources of contamination are regulated at the federal level, state level, or both to reduce the risk of release. When a business, facility, or property is identified as a potential contaminant source, this should not be interpreted to mean that this business, facility, or property is in violation of any local, state, or federal environmental law or regulation. What it does mean is that the potential for contamination exists due to the nature of the business, industry, or operation.

Section 3. Susceptibility Analysis

The susceptibility to contamination of all ground water sources in Idaho is being assessed on the following factors:

- physical integrity of the well,
- hydrologic characteristics,
- land use characteristics, and potentially significant contaminant sources
- historic water quality

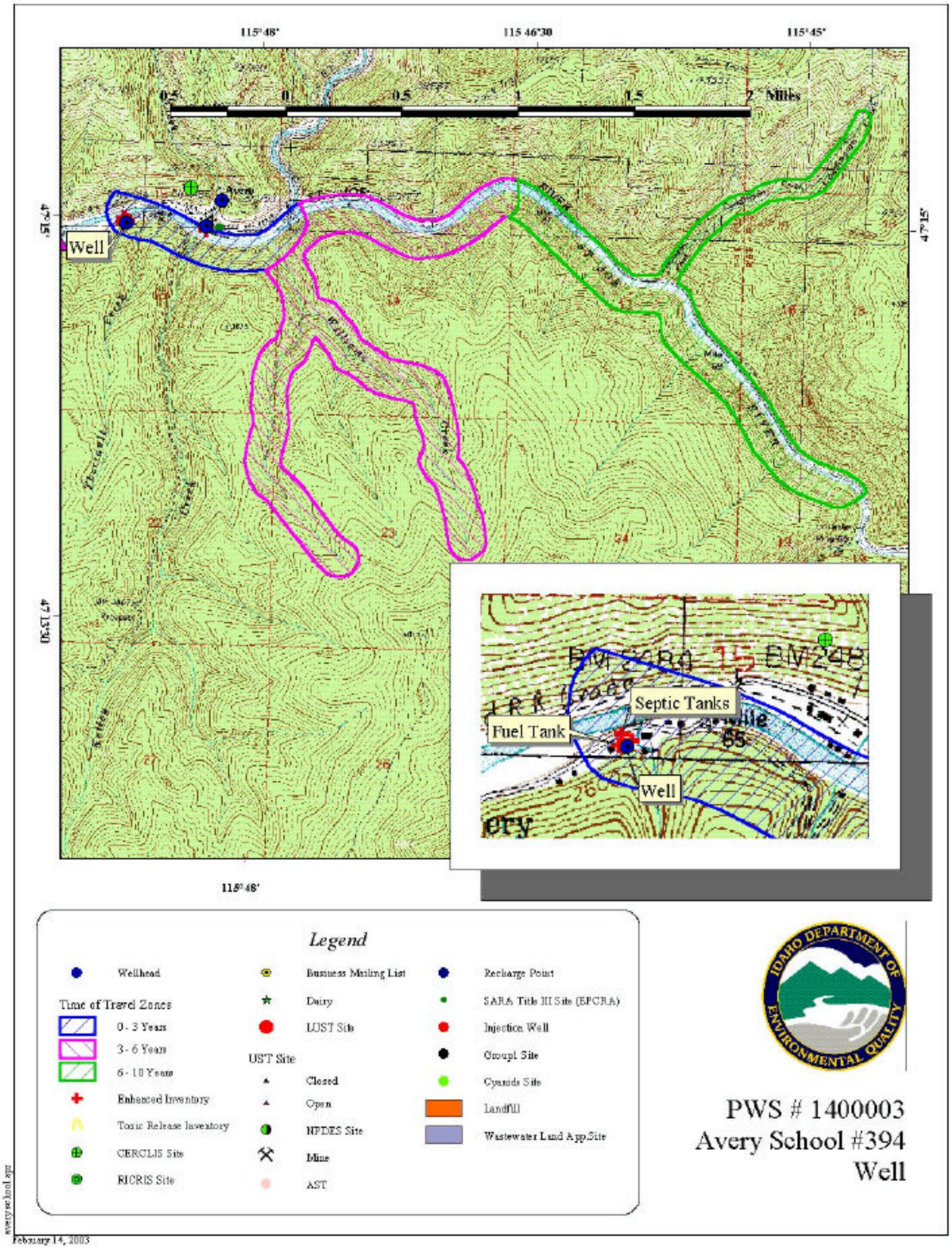
The susceptibility rankings are specific to a particular potential contaminant or category of contaminants. A high susceptibility rating relative to one potential contaminant does not mean that the water system is at the same risk for all other potential contaminants. The relative ranking that is derived for each well is a qualitative, screening-level step that, in many cases, uses generalized assumptions and best professional judgement. The following summaries describe the rationale for the susceptibility ranking. The Susceptibility Analysis Worksheet for the Avery School well, Attachment A, shows in detail how the well was scored.

Well Construction

Construction factors directly affect the ability of well to protect ground water quality. Lower scores imply a well that can better protect the water. This portion of the susceptibility analysis relies on information from individual well logs and from the most recent sanitary survey of the public water system. A partial well log for deepening the Avery School well and lining it with PVC is on file with DEQ. Several factors used to assess vulnerability to contamination are unknown because the original driller's report is not available. No serious deficiencies in the wellhead and surface seal maintenance were noted during a sanitary survey in 1998, but conduit covering wiring for the pump needed to be repaired.

The Avery School well was drilled in at an unknown date and deepened to 160 feet in 1982. At the same time, a four-inch PVC liner was installed to a depth of 150 feet. The well produces100 gallons per minute from a broken shale stratum 150 to 160 feet below ground. Static water level is 18 feet below land surface. No information about the steel casing and surface seal is available. The well is apparently above the 100-year flood plain, about 160 feet south of the St. Joe River and 75 feet west of Thereault Creek. A ground water under direct influence of surface water (GWUDI) inspection in August 2000 concluded that further testing is needed to determine whether the well is surface water influenced. Wells directly influenced by surface water can contain disease organisms normally found only in surface waters.

Figure 2. Avery School #394 Delineation and Potential Contaminant Inventory.



Hydrologic Sensitivity

Hydrologic sensitivity scores reflect natural geologic conditions at the well site and in the recharge zone. Information for this part of the analysis is derived from individual well logs and from the soil drainage classification inside the delineation boundaries. The Avery School well scored 6 points out of 6 points possible in the hydrologic sensitivity portion of the susceptibility analysis.

Soils in the recharge zone generally are composed of moderately well to well drained materials. Soils that drain rapidly are deemed less protective of ground water than slowly draining soils. Because the complete well log is unavailable, the soil composition above the water table at the well site is not known.

Potential Contaminant Sources and Land Use

Figure 2, *Avery School Delineation and Potential Contaminant Inventory* on page 7 shows the location of the Avery School well, and the zone of contribution DEQ delineated for it. The inset shows the area near the well. The town of Avery is partially inside the 0-3 year time of travel zone. The public water system file for Avery School shows a septic tank located about 60 feet north of the well. IDAPA 16.01.08 specifies a minimum 100-foot separation distance between wells and septic tanks or drainfields. In addition to microbial contaminants, septic system components are potential sources of nitrates. A fuel storage tank is about 45 feet west of the well. Petroleum products contain numerous volatile and synthetic organic chemical contaminants. Vehicle parking within 50 feet of the well is another potential source of petroleum contaminants. The required minimum setback between sources of synthetic and volatile organic chemicals and a public well is 50 feet. The portion of the recharge zone outside of Avery is undeveloped forest.

Historic Water Quality

Other than sporadic incidents of total coliform bacteria contamination, Avery School has had no water quality problems. The school tests monthly for total coliform. In the period from January 1998 through January 2003 routine samples taken in October 1998, February 1999 and September 2001 were positive. Total coliform bacteria were absent in follow up samples and samples tested in the intervening months. The school does not chlorinate its water. Chemical sampling results for the school are summarized on the table below.

Table 1. Avery School Chemical Sampling Results

Primary IOC Contaminants (Mandatory Tests)							
Contaminant	MCL (mg/l)	Results (mg/l)	Dates	Contaminant	MCL (mg/l)	Results (mg/l)	Dates
Antimony	0.006	ND	3/20/95, 12/16/98, 12/31/01	Nitrate	10	ND ,0.5	12/15/94 through 11/19/02
Arsenic	0.01	ND	3/20/95, 12/16/98, 12/28/00, 12/31/01	Nickel	N/A	ND	3/20/95, 12/16/98, 12/31/01
Barium	2	ND	3/20/95, 12/16/98, 12/31/01	Selenium	0.05	ND	3/20/95, 12/16/98, 12/31/01
Beryllium	0.004	ND	3/20/95, 12/16/98, 12/31/01	Sodium	N/A	3.56 to 4.12	3/20/95, 12/16/98, 12/31/01
Cadmium	0.005	ND	3/20/95, 12/16/98, 12/31/01	Thallium	0.002	ND	3/20/95, 12/16/98, 12/31/01
Chromium	0.1	ND	3/20/95, 12/16/98, 12/31/01	Cyanide	0.02	ND	3/20/95
Mercury	0.002	ND	3/20/95, 12/16/98, 12/31/01	Fluoride	4.0	ND	3/20/95, 12/16/98, 12/31/01

Secondary and Other IOC Contaminants (Optional Tests)			
Contaminant	Recommended Maximum (mg/l)	Results (mg/l)	Dates
Sulfate		6.73, 6.4	3/20/95, 12/16/98

Regulated and Unregulated Synthetic Organic Chemicals		
Contaminant	Results	Dates
29 Regulated and 13 Unregulated Synthetic Organic Compounds	None Detected	9/28/93, 12/16/98

Regulated and Unregulated Volatile Organic Chemicals		
Contaminant	Results	Dates
21 Regulated And 16 Unregulated Volatile Organic Compounds	None Detected	9/28/93, 12/16/98

Final Susceptibility Ranking

The Avery School well automatically ranked highly susceptible to all classes of regulated contaminants because of a septic tank about 60 feet from the well and a fuel storage tank 45 feet away. The minimum sanitary setback between a well and individual septic system is 100 feet. The required minimum setback between a public well and sources of volatile and synthetic organic chemical contaminants is 50 feet. Total scores for system construction and hydrologic sensitivity along with the cumulative scores for land use and potential contaminant sites are shown on Table 2. The complete Susceptibility Analysis Worksheet for the Avery School well is in Attachment A.

The final scores for the susceptibility analysis were determined using the following formulas:

1) VOC/SOC/IOC Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.2)
2) Microbial Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.35)

If there are no contaminants in the sanitary setback zone, final ranking categories are determined as follows:

- 0 - 5 Low Susceptibility
- 6 - 12 Moderate Susceptibility
- > 13 High Susceptibility.

Table 2. Summary of Avery School Susceptibility Evaluation

Cumulative Susceptibility Scores						
Well Name	System Construction	Hydrologic Sensitivity	Contaminant Inventory			
			IOC	VOC	SOC	Microbial
Well #1	3	6	5	5	5	6
Final Susceptibility Ranking						
	IOC		VOC		SOC	Microbial
Well #1	*High		*High		*High	*High

*High due to presence contaminant source inside sanitary setback zone.
IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

Section 4. Options for Source Water Protection

The susceptibility assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what the susceptibility ranking a source receives, protection is always important. Whether the source is currently located in a "pristine" area or an area with numerous industrial and/or agricultural land uses that require education and surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources.

It is important to remember that activity near a well is more likely to cause contamination problems than activities elsewhere in the recharge zone. A map of the area within 500 feet of the well that was prepared as part of the initial GWUDI evaluation shows a septic tank 60 feet from the well, and a fuel storage tank 45 feet from the well. Pictures of the site show RV and bus parking at an unspecified distance, but very near the well. School maintenance personnel should measure the distances from the well to theses potential sources of contamination. *Idaho Rules for Public Drinking Water Systems* specify a minimum setback between public wells and individual septic tanks of 100 feet. The minimum separation distance between a well and sources of volatile or synthetic organic chemical contaminants is 50 feet. It may be necessary to move the fuel and septic tanks or to apply for a waiver from the required setback distances since the school is located in a narrow canyon that must also accommodate roads and the river. The risk to the well from the fuel tank is somewhat mitigated by the presence of a secondary containment structure. A 50-foot radius around the well should be marked off and possibly fenced to keep vehicles off the well lot. Paving and sloping the parking area away from the well provides some protection against the contaminants associated with parked vehicles. The school should also enlist the cooperation of nearby homeowners to ensure that potential contaminants commonly found in garages and shops are stored as far as possible from the well head.

It might be helpful for the school to investigate ground water stewardship programs like Home*A*Syst. These programs help well owners assess everyday activities for their potential for polluting their water source. In many cases, inexpensive changes can greatly reduce the risk of a well becoming contaminated. A voluntary measure every system should implement is development of a water emergency response plan. There is a simple fill-in-the-blanks form available on the DEQ website to guide systems through the process.

Assistance

Public water suppliers and users may call the following IDEQ offices with questions about this assessment and to request assistance with developing and implementing a local protection plan. In addition, draft protection plans may be submitted to the IDEQ office for preliminary review and comments.

Idaho Department of Environmental Quality

Coeur d'Alene Regional IDEQ Office	(208) 769-1422
State IDEQ Office, Boise	(208) 373-0502
Website:	www.deq.state.id.us

Idaho Rural Water Association

Melinda Harper, Groundwater Protection Specialist	(800) 962-3257
Website:	http://www.idahoruralwater.com

References Cited

Freeze, R.A., and J.A. Cherry, 1979, Groundwater, Prentice-Hall, Inc., 604 p.

Great Lakes-Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers, 1997. "Recommended Standards for Water Works."

Idaho Department of Environmental Quality, 1997. Design Standards for Public Drinking Water Systems. IDAPA 58.01.08.550.01.

Idaho Division of Environmental Quality, 1999, Idaho Source Water Assessment Plan, October, 39 p.

Idaho Division of Environmental Quality, 1997, Idaho Wellhead Protection Plan, Idaho Wellhead Protection Work Group, February.

Idaho Department of Water Resources, 1993. Administrative Rules of the Idaho Water Resource Board: Well Construction Standards Rules. IDAPA 37.03.09.

Theis, C.V., 1935, The Relation between Lowering of the Piezometric Surface and the Rate and Duration of Discharge of a Well Using Groundwater Storage, Trans. Amer. Geophysical Union, v. 16, pp. 519-524.

Attachment A

Avery School
Susceptibility Analysis Worksheet

Ground Water Susceptibility

Public Water System Name : **AVERY SCHOOL 394** Source: **WELL #1**

Public Water System Number : **1400003** 2/13/03 12:47:22 PM

1. System Construction		SCORE			
Drill Date	UNKNOWN				
Driller Log Available	Partial log for deepening well				
Sanitary Survey (if yes, indicate date of last survey)	YES 1998				
Well meets IDWR construction standards	UNKNOWN	1			
Wellhead and surface seal maintained	YES	0			
Casing and annular seal extend to low permeability unit	UNKNOWN	2			
Highest production 100 feet below static water level	YES	0			
Well located outside the 100 year flood plain	YES	0			
Total System Construction Score		**3**			
2. Hydrologic Sensitivity					
Soils are poorly to moderately drained	NO	2			
Vadose zone composed of gravel, fractured rock or unknown	UNKNOWN	1			
Depth to first water > 300 feet	NO	1			
Aquitard present with > 50 feet cumulative thickness	UNKNOWN	2			
Total Hydrologic Score		**6**			
		IOC	VOC	SOC	Microbial
3. Potential Contaminant / Land Use - ZONE 1A (Sanitary Setback)		Score	Score	Score	Score
Land Use Zone 1A	RESIDENTIAL	2	2	2	2
Farm chemical use high	NO	0	0	0	
IOC, VOC, SOC, or Microbial sources in Zone 1A	YES Septic Tank, Fuel tank vehicle parking	YES	YES	YES	YES
Total Potential Contaminant Source/Land Use Score - Zone 1A		**2**	**2**	**2**	**2**
Potential Contaminant / Land Use - ZONE 1B (3 YR. TOT)					
Contaminant sources present (Number of Sources)	YES. Septic Tank, Surface Water, Fuel Storage Tank	1	1	1	2
(Score = # Sources X 2) 8 Points Maximum		2	2	2	4
Sources of Class II or III leacheable contaminants or Microbials	YES	1	1	1	
4 Points Maximum		1	1	1	
Zone 1B contains or intercepts a Group 1 Area	NO	0	0	0	0
Land use Zone 1B	Less Than 25% Agricultural Land	0	0	0	0
Total Potential Contaminant Source / Land Use Score - Zone 1B		**3**	**3**	**3**	**4**
Potential Contaminant / Land Use - ZONE II (6 YR. TOT)					
Contaminant Sources Present	NO	0	0	0	
Sources of Class II or III leacheable contaminants or Microbials	NO	0	0	0	
Land Use Zone II	Less than 25% Agricultural Land	0	0	0	
Potential Contaminant Source / Land Use Score - Zone II		**0**	**0**	**0**	**0**
Potential Contaminant / Land Use - ZONE III (10 YR. TOT)					
Contaminant Source Present	NO	0	0	0	
Sources of Class II or III leacheable contaminants or Microbials	NO	0	0	0	
Do irrigated agricultural lands occupy > 50% of Zone	NO	0	0	0	
Total Potential Contaminant Source / Land Use Score - Zone III		**0**	**0**	**0**	**0**
Cumulative Potential Contaminant / Land Use Score		**5**	**5**	**5**	**6**
4. Final Susceptibility Source Score		**10**	**10**	**10**	**11**
5. Final Well Ranking		***HIGH**	***HIGH**	***HIGH**	***HIGH**

POTENTIAL CONTAMINANT INVENTORY
List of Acronyms and Definitions

AST (Aboveground Storage Tanks) – Sites with aboveground storage tanks.

Business Mailing List – This list contains potential contaminant sites identified through a yellow pages database search of standard industry codes (SIC).

CERCLIS – This includes sites considered for listing under the **Comprehensive Environmental Response Compensation and Liability Act (CERCLA)**. CERCLA, more commonly known as ? Superfund? is designed to clean up hazardous waste sites that are on the national priority list (NPL).

Cyanide Site – DEQ permitted and known historical sites/facilities using cyanide.

Dairy – Sites included in the primary contaminant source inventory represent those facilities regulated by Idaho State Department of Agriculture (ISDA) and may range from a few head to several thousand head of milking cows.

Deep Injection Well – Injection wells regulated under the Idaho Department of Water Resources generally for the disposal of stormwater runoff or agricultural field drainage.

Enhanced Inventory – Enhanced inventory locations are potential contaminant source sites added by the water system. These can include new sites not captured during the primary contaminant inventory, or corrected locations for sites not properly located during the primary contaminant inventory. Enhanced inventory sites can also include miscellaneous sites added by the Idaho Department of Environmental Quality (DEQ) during the primary contaminant inventory.

Floodplain – This is a coverage of the 100year floodplains.

Group 1 Sites – These are sites that show elevated levels of contaminants and are not within the priority one areas.

Inorganic Priority Area – Priority one areas where greater than 25% of the wells/springs show constituents higher than primary standards or other health standards.

Landfill – Areas of open and closed municipal and non-municipal landfills.

LUST (Leaking Underground Storage Tank) – Potential contaminant source sites associated with leaking underground storage tanks as regulated under RCRA.

Mines and Quarries – Mines and quarries permitted through the Idaho Department of Lands.)

Nitrate Priority Area – Area where greater than 25% of wells/springs show nitrate values above 5mg/l.

NPDES (National Pollutant Discharge Elimination System) – Sites with NPDES permits. The Clean Water Act requires that any discharge of a pollutant to waters of the United States from a point source must be authorized by an NPDES permit.

Organic Priority Areas – These are any areas where greater than 25 % of wells/springs show levels greater than 1% of the primary standard or other health standards.

Recharge Point – This includes active, proposed, and possible recharge sites on the Snake River Plain.

RICRIS – Site regulated under **Resource Conservation Recovery Act (RCRA)**. RCRA is commonly associated with the cradle to grave management approach for generation, storage, and disposal of hazardous wastes.

SARA Tier II (Superfund Amendments and Reauthorization Act Tier II Facilities) – These sites store certain types and amounts of hazardous materials and must be identified under the Community Right to Know Act.

Toxic Release Inventory (TRI) – The toxic release inventory list was developed as part of the Emergency Planning and Community Right to Know (Community Right to Know) Act passed in 1986. The Community Right to Know Act requires the reporting of any release of a chemical found on the TRI list.

UST (Underground Storage Tank) – Potential contaminant source sites associated with underground storage tanks regulated as regulated under RCRA.

Wastewater Land Applications Sites – These are areas where the land application of municipal or industrial wastewater is permitted by DEQ.

Wellheads – These are drinking water well locations regulated under the Safe Drinking Water Act. They are not treated as potential contaminant sources.

NOTE: Many of the potential contaminant sources were located using a geocoding program where mailing addresses are used to locate a facility. Field verification of potential contaminant sources is an important element of an enhanced inventory.

Where possible, a list of potential contaminant sites unable to be located with geocoding will be provided to water systems to determine if the potential contaminant sources are located within the source water assessment area.